Kotlin Primer

Ramp up

Introduction

First and almost, why did i choose Kotlin ?

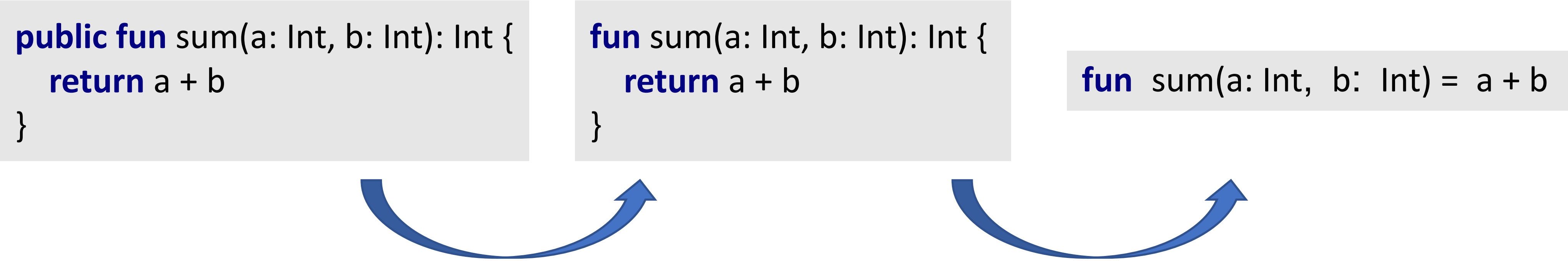
- Because i get more than half of Effective Java implemented by it.
- It‘s a modern language with less overhead than java
- You write less and safer code

An overview of what u can expect

- Basic syntax (Functions, properties vs fields, collections,classes. ...)
- Std. lib functions (let, apply, run, with,....)
- Nullability
- Sealed & data classes
- Destructering
- Extensions

Basic syntax - Function Declaration

In Kotlin, in contrast to Java you specify first the **name** of the variable followed by it‘s **type**



```
public fun sum(a: Int, b: Int): Int {
    return a + b
}
```

```
fun sum(a: Int, b: Int): Int {
    return a + b
}
```

```
fun  sum(a: Int,  b:  Int) =  a + b
```

Visibiliy modifier can be omitted, if it‘s public

Method block can be omitted if it‘s a simple one-liner

Basic syntax – Functions & default values

You can finally use **default values** for parameters passed into a **function** or **constructor** and you can (must) also use **named parameters**

```
public fun sum(a: Int = 10, b: Int): Int {
   return a + b
}
```

```
sum(b = 2)
sum(a = 2, b = 5)
```

Basic syntax – Function types

In Kotlin, functions are „*first-class citizen*“, which means:

- A function can be assigned to a variable
- Passed as an argument to another function
- Returned from a function

But Kotlin is also statically typed, therefore functions have a type, which is called **function type**

- () -> Unit
- (Int) -> Double
- () -> () -> Unit

```
class MyFunction: () -> Unit{
   override fun invoke() {
      println("MyFunction called")
   }
}
```

Basic syntax – Function literals

Another way of providing a function is to use a **function litera**l. A function literal is a special notation used to simplify how a function is defined.

- **Lambda expressions**
- **Anonymous functions**

Lambda expression is a short way to define a function.

```
val greetings: () -> Unit = { println("Greetings") }

val divideByHalf: (Int) -> Int = { x -> x / 2 }
```

Anyonymous function is an alternative way to define a function

```
val greetings = fun() { println("Greetings") }

val divideByHalf = fun(x: Int) = x/2
```

Basic syntax – Higher Order Functions

A higher order function is a function which takes other functions as parameter or returns a functions.

```
fun isOdd(x: Int) = x % 2 != 0
```

This function can now be used as an argument in another function in different ways:

Given the following list:

```
val listOfNumbers = mutableListOf<Int>(1,2,3,4)
```

```
listOfNumbers.filter(::isOdd)
```

```
istOfNumbers.filter { isOdd(it) }
```

```
val predicate : (Int) -> Boolean = ::isOdd
numbers.filter(predicate)
```

```
listOfNumbers.filter { it % 2 != 0 })
```

Basic syntax – Function composition

Consider the follwing function:

```
fun <A, B, C> compose(f: (B) -> C, g: (A) -> B): (A) -> C {
   return { x -> f(g(x)) }
}
```

```
compose(f, g) = f(g(*))
```

Now given the following callable references:

```
fun isOdd(x: Int) = x % 2 != 0

fun length(string: String) = string.length
```

We can compose them by:

```
val oddLength = compose(:isOdd,::length)
```

```
listOfStrings.filter(oddLength)
```

Basic syntax – Classes

A **big difference** to Java regarding **classes** in **Kotlin** is the fact that they **are final by default.**

There are 4 types of classes in Kotlin:

- Normal class
- Data class
- Sealed class
- Enum class

In contrast to Java and very similiar to Swift, Kotlin distinguishes between a **primary** and **secondary** constructor

The rule is simple: Every secondary constructor has to call the primary constructor!

Basic syntax – Classes (Primary & Secondary Constructors)

```
class Test{} or class Test
```

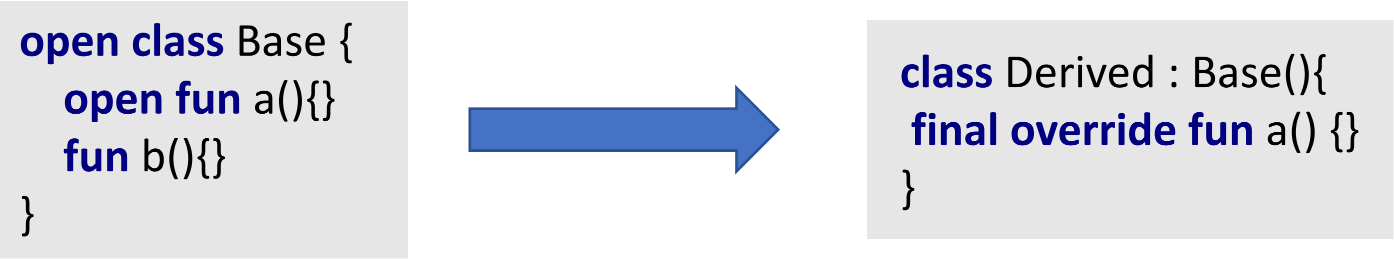
```
class Test constructor(variable: Any)
```

```
class Test constructor(variable: Any){
    init{
        val instanceVariable = variable
    }
}
```

```
class TestClass constructor(val variable1: Any, val variable2: Any){

    constructor(variable1: Any) :  this(variable1,"")

    constructor() :  this("","")

}
```

Basic syntax – Class inheritance

As already mentioned every class in Kotlin is **final** by default, to open up a class for inheritance we have to use the **open** keyword.



```
open class Base {
   open fun a(){}
   fun b(){}
}
```

```
class Derived : Base(){
 final override fun a() {}
}
```

The **same rules** also apply for **overriding properties**. With one exception:

Val properties can be overriden by var variables but **not the otherway arround.**

Basic syntax – Object keyword

In Kotlin there is **no static keyword** nor are there **anonymous classes**.

Instead Kotlin introduced a new keyword **object** which serves two purposes.

- Object declaration
  - Replacement for singleton pattern
- Object expression
  - Replacment for anonymous classes

Basic syntax – Object declaration

Objects can‘t have have any constructors, therefore you can’t pass any argument to it but they can have members as normal classes.

```
object RedditService{
   private lateinit var api : RedditAPI
   init {
      api = Retrofit.Builder()
            .baseUrl(URL)
            .build()
            .create(RedditAPI::class.java)
   }
   fun getRedditPosts(title: String, sortOrder: String = "top") = api.getRedditPosts()
}
```

Basic syntax – Object expression

Object expression is a structure that creates a single instance of an object:

```
val clickPt = object {
   var x = 10
   var y = 10
}
```

You will use it alot throughout your code as this pattern is used to subsitute the Java anonymous classes.

```
username.addTextChangedListener(object : TextWatcher {
    //...
   override fun afterTextChanged(editable: Editable) {
              //...
   }
})
```

Basic syntax – Companion obejct

Companion objects is a brother of the object declaration. It works the same, but it takes the name of the enclosing class.

```
class TestFragment: Fragment(){

    companion object Factory {

        fun getInstance(arg: Map<String,String>): TestFragment{
            val fragment = TestFragment().apply {
                val bundle  = Bundle()
                arguments = bundle
            }
            return fragment
        }
    }
}
```

Basic syntax – Properties vs Fields

First and all, in Kotlin we distinquish between **mutable (var)** & **immutable (val)** variables.

So how to properties (fields) look in Java and Kotlin?

```java
public String name = "Chris";
```

```kotlin
var name: String = "Chris"
```

```java
private String name = "Chris";

public String getName() {
   return name;
}

public void setName(String name) {
   this.name = name;
}
```

They both look very similiar, do they?

Actually these are 2 completely different concepts.

Basic syntax – General structure of properties

That is how a property in Kotlin is defined:

```
[val | var ] <Property Name> : <Property Typ> = <Property Initialisation>
        <getter>
        <setter>
```

There is no need to define custom getter or setter, you can directly control the visiblity or behaviour of a property while u declaring it.

```
var name: String = "Chris"
private set
```

```
var name: String = ""
      get() = "Chris"
      private set
```

Basic syntax – Properties and fields

Normally there are no **(backing) fields** on class level in Kotlin, only properties. But you have the possibility to define a backing field when you are working inside a **customer getter** or **setter**.

This will then look like as follows:

```
var name: String = ""
 get() = field
 set(value){
    if (value != null){
        field = value
    }
 }
```

We will get back to the properties syntax when we are looking into **Delegates**

Basic syntax – Collections

- **List**:
  - listOf(T) or mutableListOf(T)
- **Set**
  - setOf(T) or mutableSetOf(T)
- **Map**
  - mapOf(key ‘to‘ value, key ‘to‘ value,...) or mutableMapOf(..)

You can acces elements inside collections by the use of the property syntax similiar to JavaScript.

```
var mutableList = mutableListOf("1","2","3")
println(mutableList[1])
```

End of section: Basic syntax

Any questions ?